Activity Title: Scalloping Across the Seafloor

Subject: The lesson addresses the geographic distribution of the Atlantic Sea Scallop.

Grade Level: High School
Average Learning Time: 2 hours

Lesson Summary: The student will gain an understanding of the relative abundance of the Atlantic Sea Scallop in various areas of the Atlantic Ocean and the factors that impact the population distribution.

Overall Concept: Why is it important to conduct surveys to estimate relative abundance of many finfish and shellfish species in the Northeast region of the Atlantic Ocean?

Specific Concepts: Sea Scallop surveys are conducted to determine the distribution and abundance in order to assess the populations in certain areas of the Atlantic Ocean and determine if they have been overharvested and need to be closed to commercial fishing for a period of time.

Focus Questions:

1. What is the life cycle of the Atlantic Sea Scallop?
2. What biological parameters affect the relative abundance of the Atlantic Sea Scallop?
3. What are some examples of predators of the Atlantic Sea Scallop?
4. What is the diet of the sea scallop and what method of feeding do they utilize?
5. What are the ideal water parameters that promote optimal growth for the sea scallop?
6. What are some examples of anthropogenic activities that have a negative impact on the sea scallop?
7. What are the two main methods that are used to conduct population surveys?
8. What data is collected at each station during each leg of the survey?
9. What does sustainability mean and how does it relate to this lesson?
10. How will the closure of low populated areas for a given amount of time help this species?

Objectives/Learning Goals:

- Students will simulate a sea scallop survey by participating in a game.
- Students will record real data of catch weights and catch numbers at random stations of the survey on a personal data sheet.
- Students will record possible natural and anthropogenic hazards of the Atlantic sea scallop on a personal data sheet.
- Students will interpret information collected and assess the sustainability of the species in the geographical areas.

- Students will research the Woods Hole Oceanographic Institution's Habitat Mapping Camera (HabCam)
- Students will research the Fisheries Scientific Computer System

Background Information:

The Atlantic Sea Scallop is a bivalve belonging to Phylum Mollusca. Most of the world's largest wild scallop fisheries is for *Placopecten magellanicus* found in the northeastern United States in the Atlantic Ocean. Commercial fishing/harvesting can deplete scallop populations if their geographic distribution is not monitored and regulated. Surveys are conducted periodically to assess the abundance and overall health of the scallops to determine if certain areas need to be closed to commercial fishing. Two main methods that NOAA uses to conduct these surveys is by using an 8-foot dredge and using the Woods Hole Oceanographic Institution's Habitat Mapping Camera System (HabCam) to do population counts.

The following activity uses real data collected in 2013 by NOAA Fisheries Service and Northeast Fisheries Science Center. Only data collected by dredging is reflected in the survey. The survey is divided up into three geographical areas: Leg 1, Leg 2 and Leg 3. There are a total of 192 stations which were randomly selected by a computer program.

Scallops that have been collected at each station are measured and weighed using the Fisheries Scientific Computer System. Groundfish and other organisms dredged up are also weighed, measured and counted. Scallops and other organisms are returned to ocean unharmed.

Common Misconceptions/Preconceptions:

- All scallops are sessile.
- All scallops have ridges on their shells.
- Scallop populations will never be completely depleted.

Materials: Game Board, one research vessel game piece, "Real Data" Station Cards (Packet), Student Data Sheets (each student), dice, instructions for playing the game, analysis questions, graph paper (optional), calculators if needed, internet access

Technical Requirements: Internet access to research key words

Teacher Preparation:

- Set up game boards and provide a marker for the research vessel. (see game board setup)
- Provide a "Real Data" packet for each group.
- Provide each student a Personal Data Sheet.

Keywords: Overfishing, commercial fishing/harvesting, maximum sustainable yield, renewable resources, Tragedy of the Commons, conservation, commercial dredging, Fisheries Scientific Computer System (FSCS System), Habitat Camera (Woods Hole)

Pre-assessment Strategy/Anticipatory Set
Show an example of an Atlantic Sea Scallop. (*Placopecten magellanicus)*
Lesson Procedure:

1. Read the background and research key terms.
2. Participate in the scallop game while recording data on personal data sheets. (See attached sheet for instructions on how to play the game)
3. Calculate totals for catch weight and catch numbers for each Leg of the survey. (See attached data sheets – data is actual catch weights and numbers from the 2013 Sea Scallop Survey)
4. Answer Analysis Questions # 1 – 8. (See attached sheet)
5. Graph data collected for each Leg on the Sea Scallop Survey.

Assessment and Evaluation:
Students will use real data collected on the sea scallop survey to assess the population in each area (Leg) and determine the sustainability of the species in the Northwestern Atlantic Ocean.

Standards:

National Science Education Standard(s) Addressed:

- Unifying Concepts and Processes
- Science as Inquiry
- Life Science
- Science and Technology
- Science in Personal and Social Perspectives
- History and Nature of Science

Ocean Literacy Principles Addressed:

- **Principle 5 The ocean supports a great diversity of life and ecosystems.**
  A, C, D, and F
- **Principle 6 The ocean and humans are inextricably interconnected.**
  B, D, and G
- **Principle 7 The ocean is largely unexplored.**
  C, and F

Additional Resources:

- Resource Survey Report Sea Scallop Survey (NOAA)
- NOAA Teacher At Sea Program – 2013 data
- Status of Fishery Resources off the Northeastern US (NOAA)
- NOAA Fisheries Service Northeast Fisheries Science Center, Ecosystems Surveys Branch
- HabCam (habcam.whoi.edu)
- Sea Scallop, *Placopecten magellanicus,* Life History and Habitat Characteristics (nefsc.noaa.gov)

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Scalloping Across the Seafloor

Instructions for the game:

1. Each student rolls the die to determine what station to move the research vessel (*Hugh R. Sharp)* to. The vessel will be used by all players continuously throughout the stations until it reaches the last station (#192) of Leg 3.

2. Read and record the information on the station cards from the "Real Data" packet. (Catch weight (wt), numbers and environmental scenarios) on student data sheets.

3. Continue until the research vessel has reached the end of Leg 3. (#192)

4. At the end of the game, each student adds up their catch weights and numbers from their student data sheets.

5. "Winners" can be determined by either the highest catch weight or number or a combination of both (teacher's decision)

6. Add up all catch weights and numbers for the entire survey by Leg 1, 2 and 3. This can be divided up by groups.

7. Based on the data collected, assess and discuss each Leg to determine if the area surveyed is sustainable or needs to be closed to commercial fishing. Explain your answer.

8. Answer Discussion Questions #1 – 8.

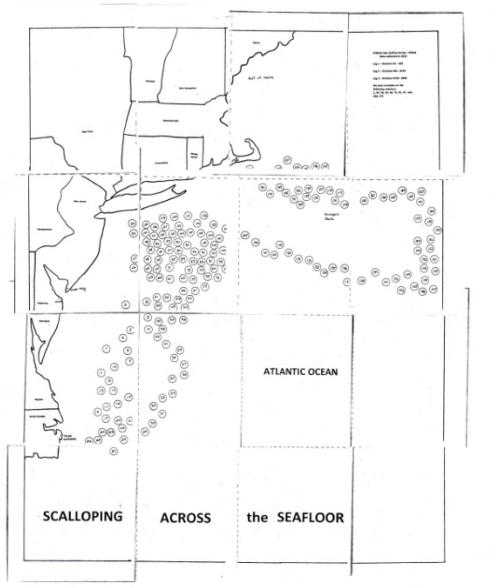
Extension:

Students graph the data of each Leg of the survey.

Game Board Assembly:

1. Duplicate all 16 sheets to the game board. Assemble each row of 4 sheets by placing sheet 4 down first. Next, place sheet 3 along the dotted line on the left edge of sheet 4. Tape together. The darker lines should line up. Next, place sheet 2 on 3 and sheet 1 on sheet 2. This is the top first row.
2. Continue assembling the next three rows the same way. After all rows are done, tape the four rows together, lining up the sates and borders. Refer to the diagrams below:

1	**2**	**3**	**4**
5	**6**	**7**	**8**
9	**10**	**11**	**12**
13	**14**	**15**	**16**



Map Pieces for Assembly

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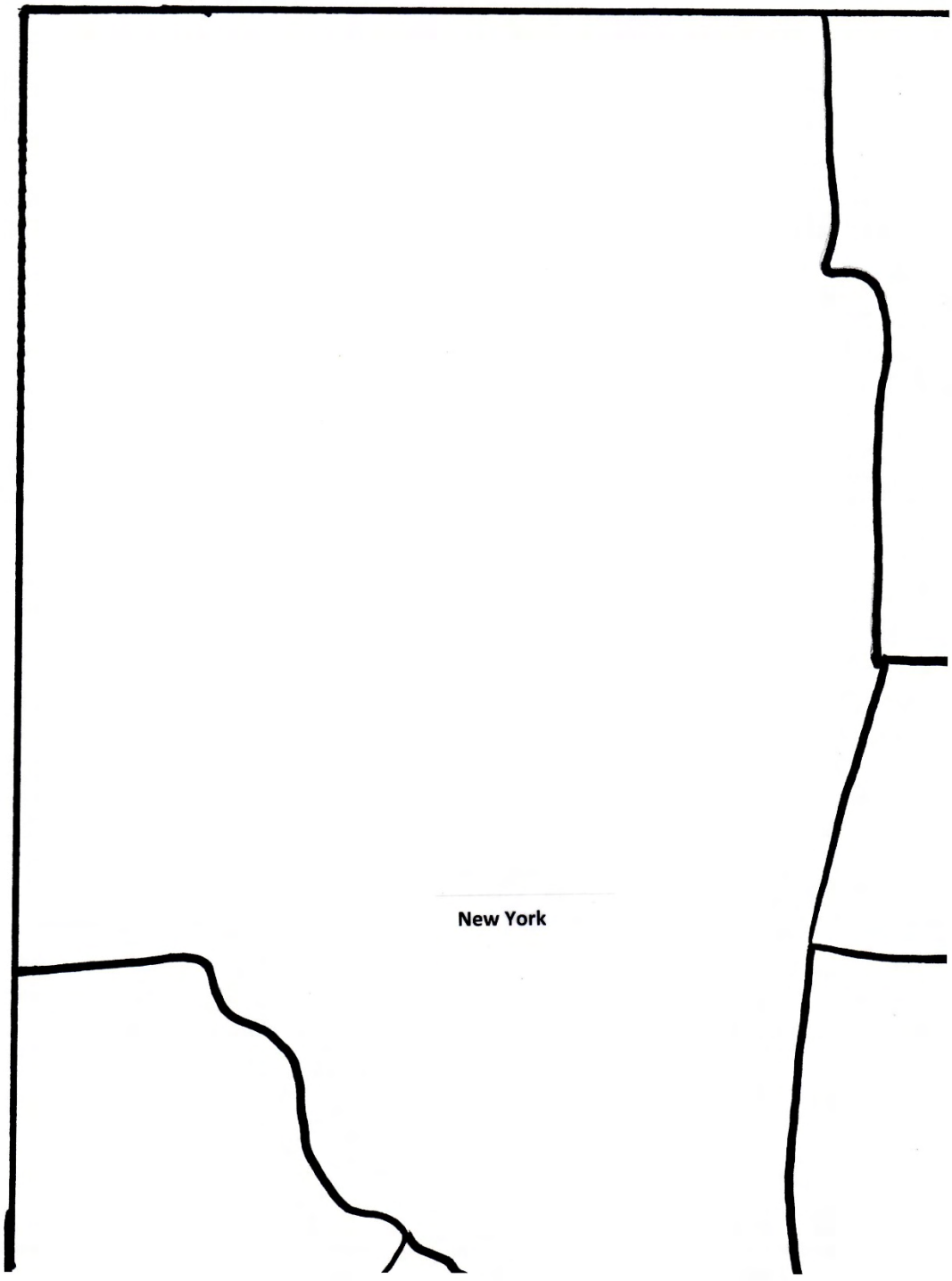

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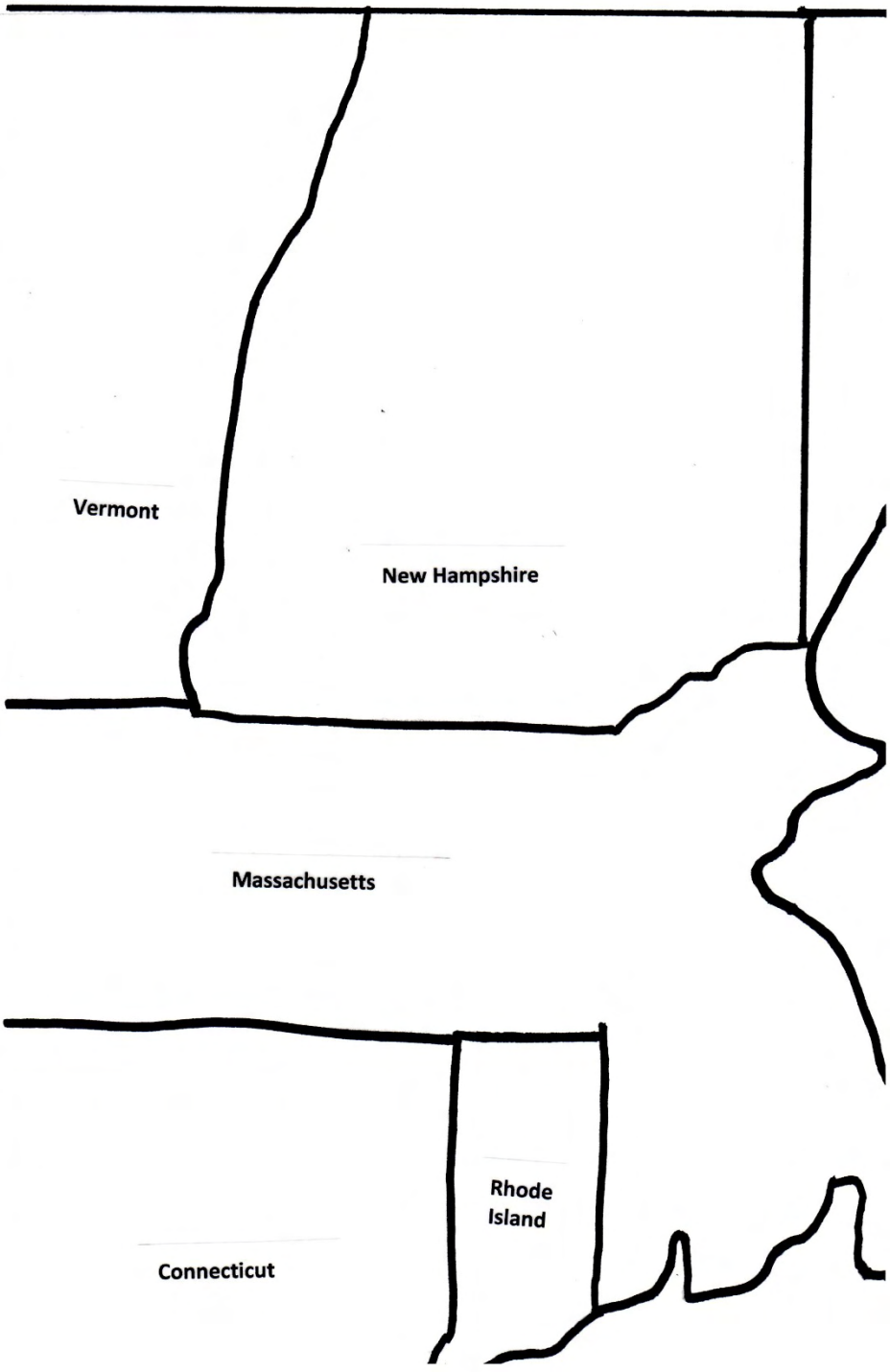

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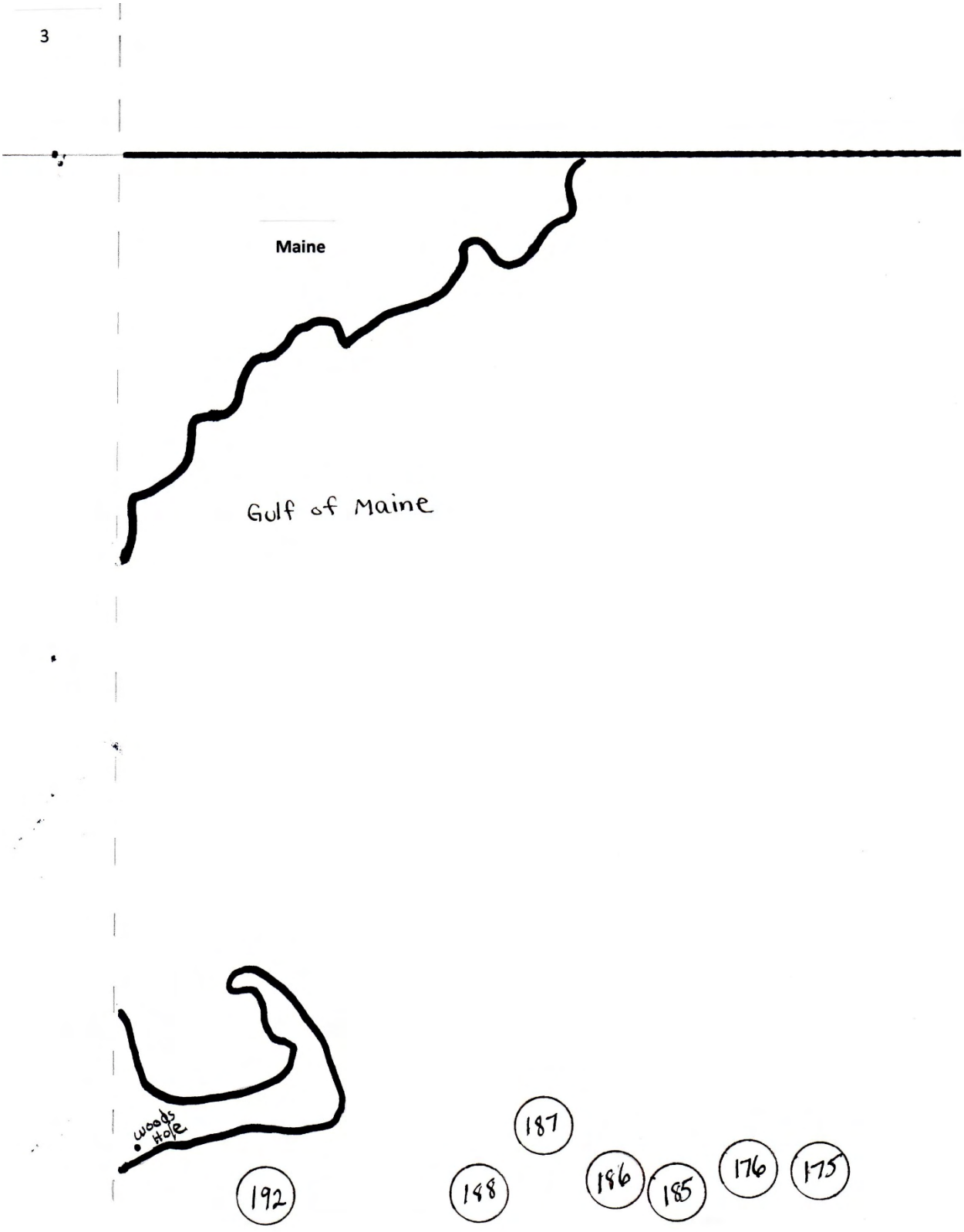

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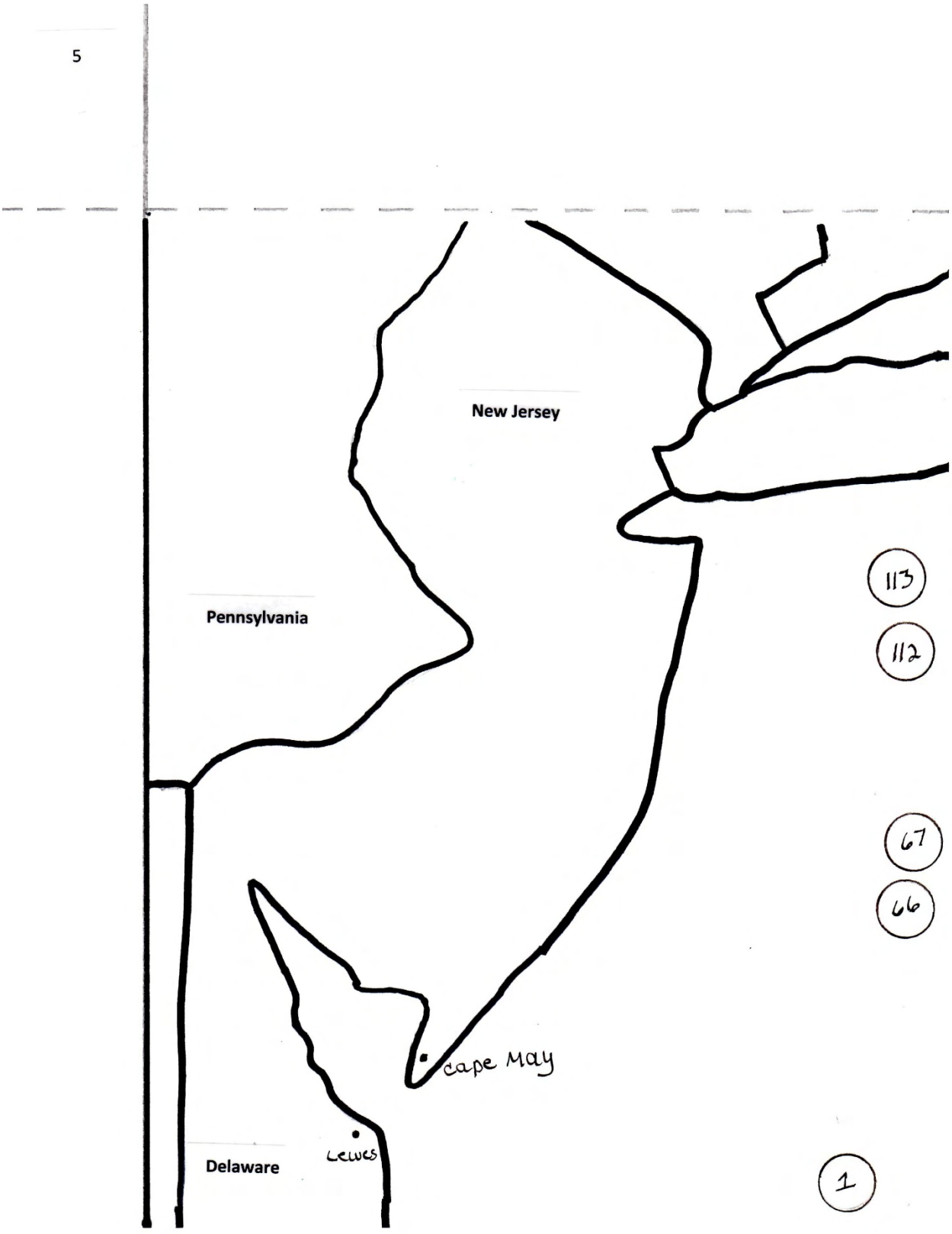

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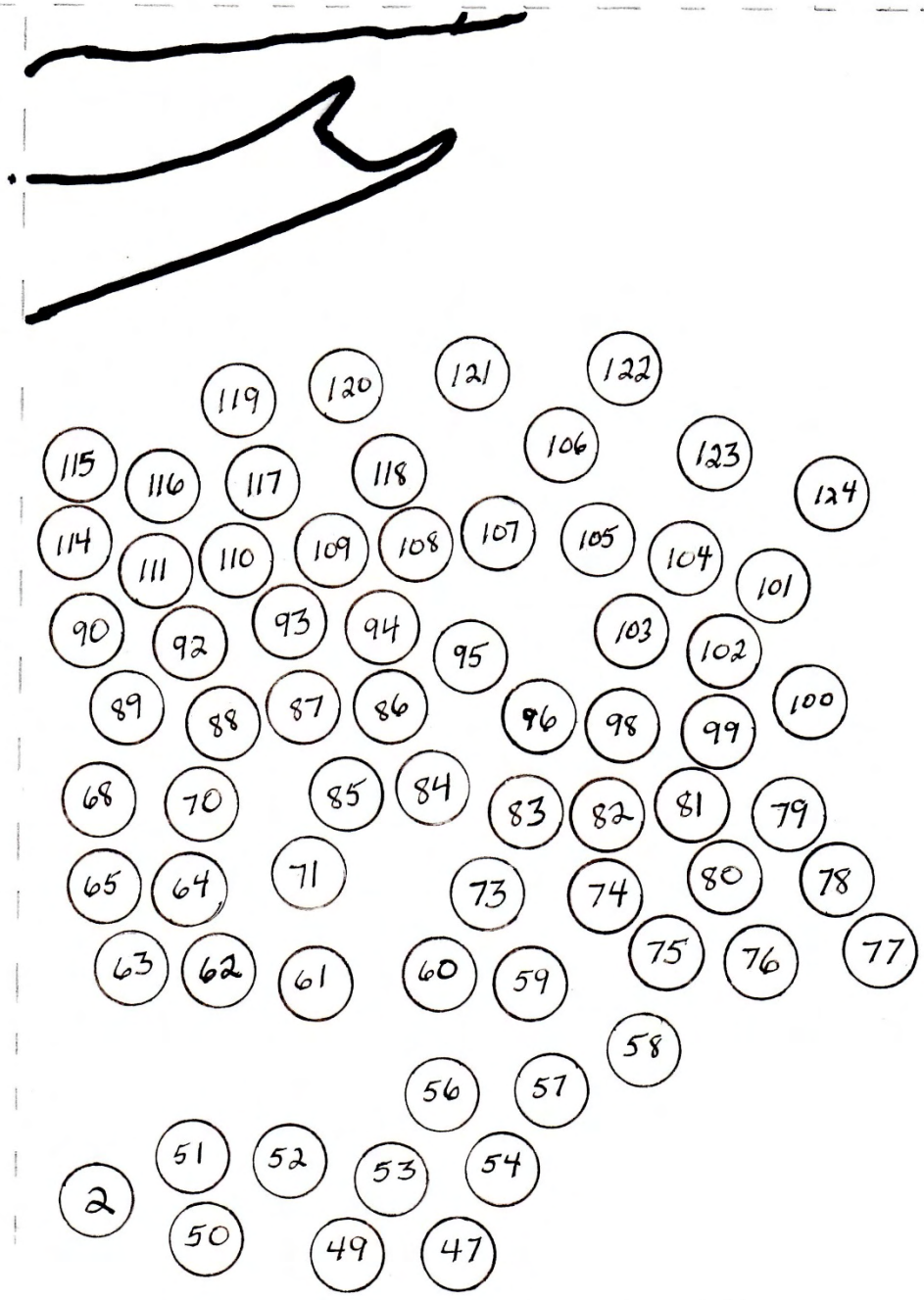
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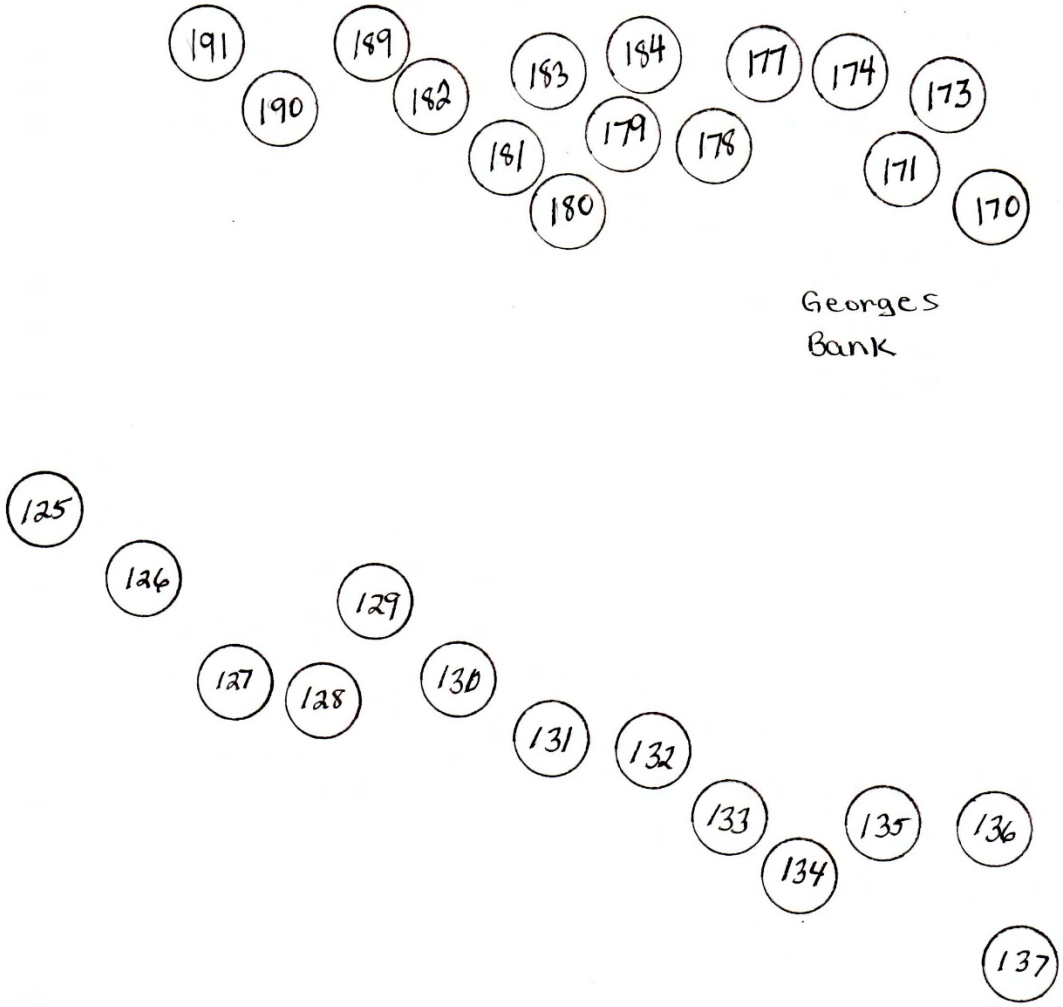
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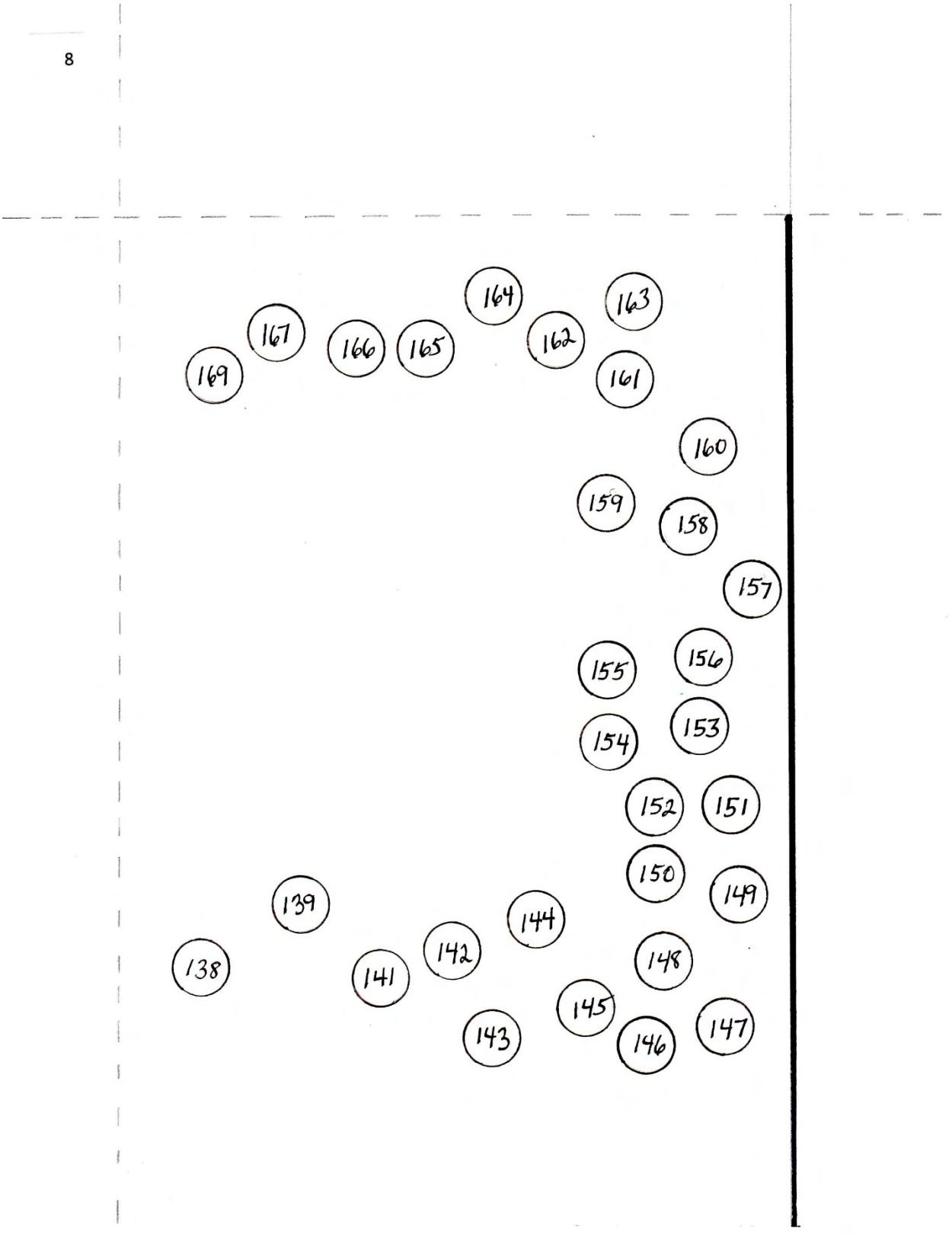
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Map Pieces for Assembly

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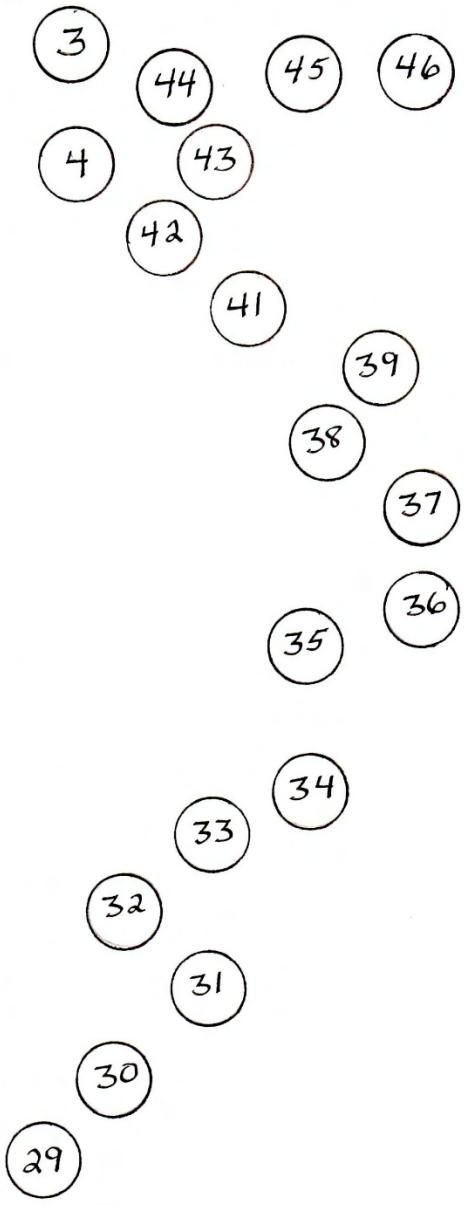

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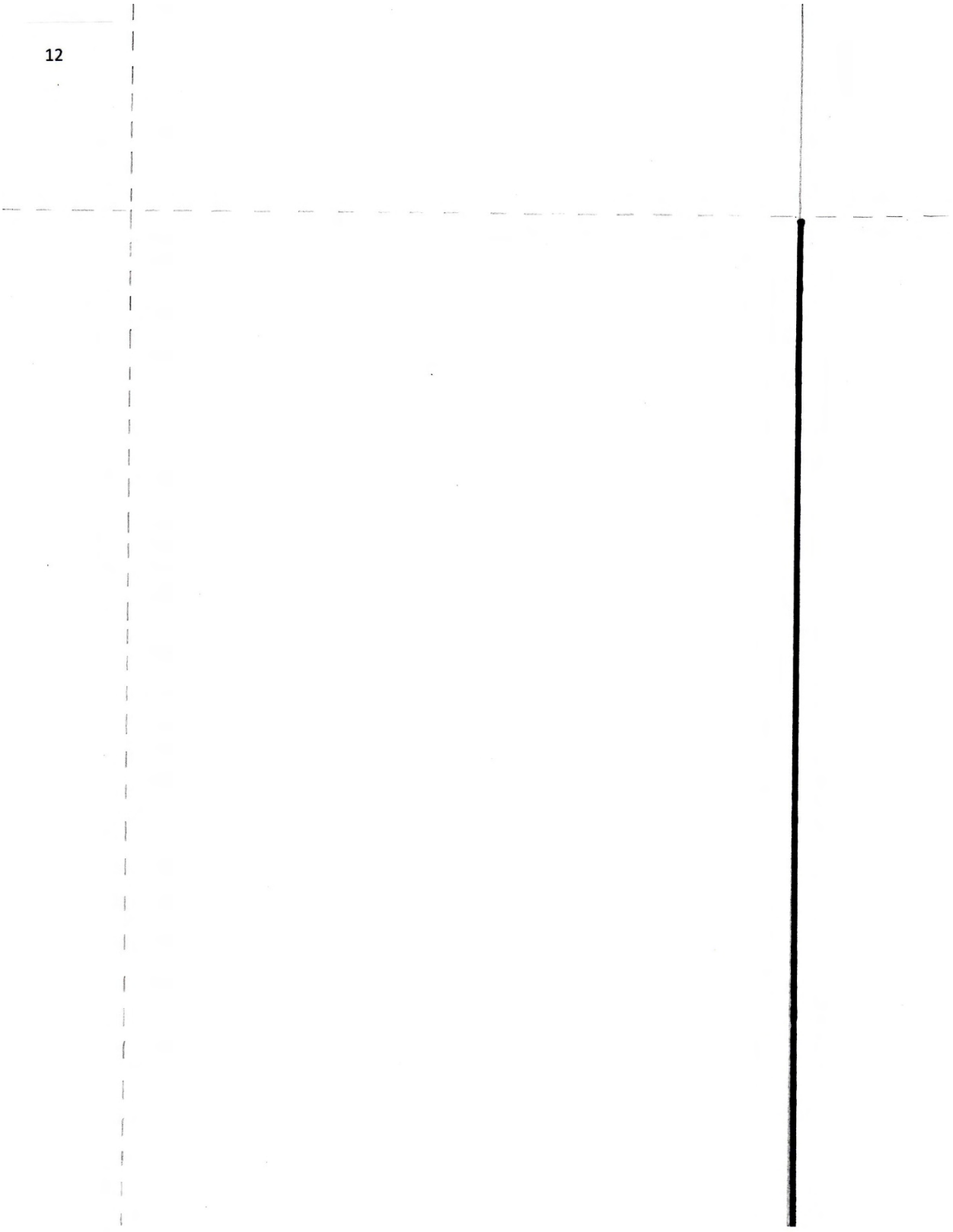
ATLANTIC OCEAN

Map Pieces for Assembly



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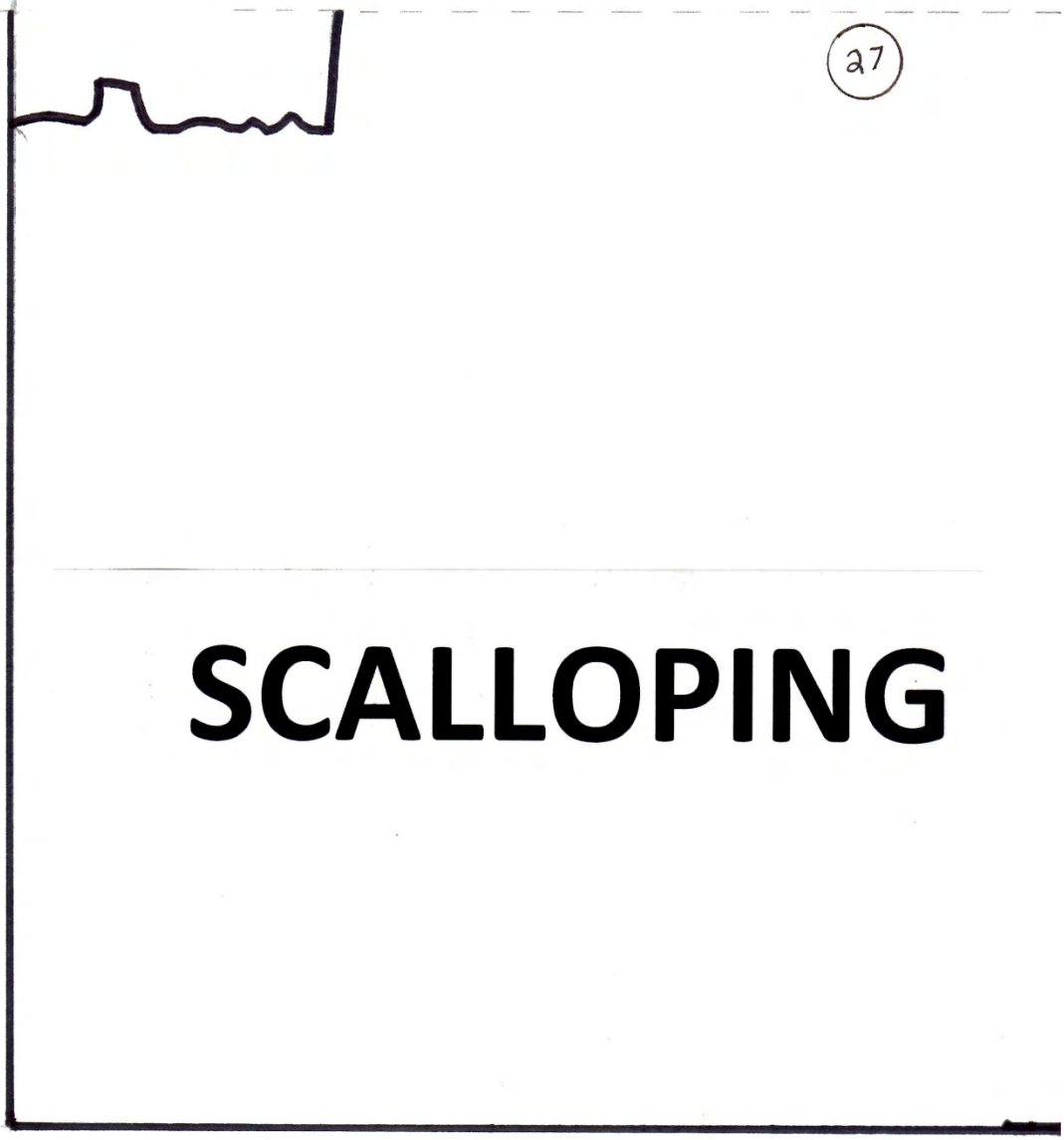

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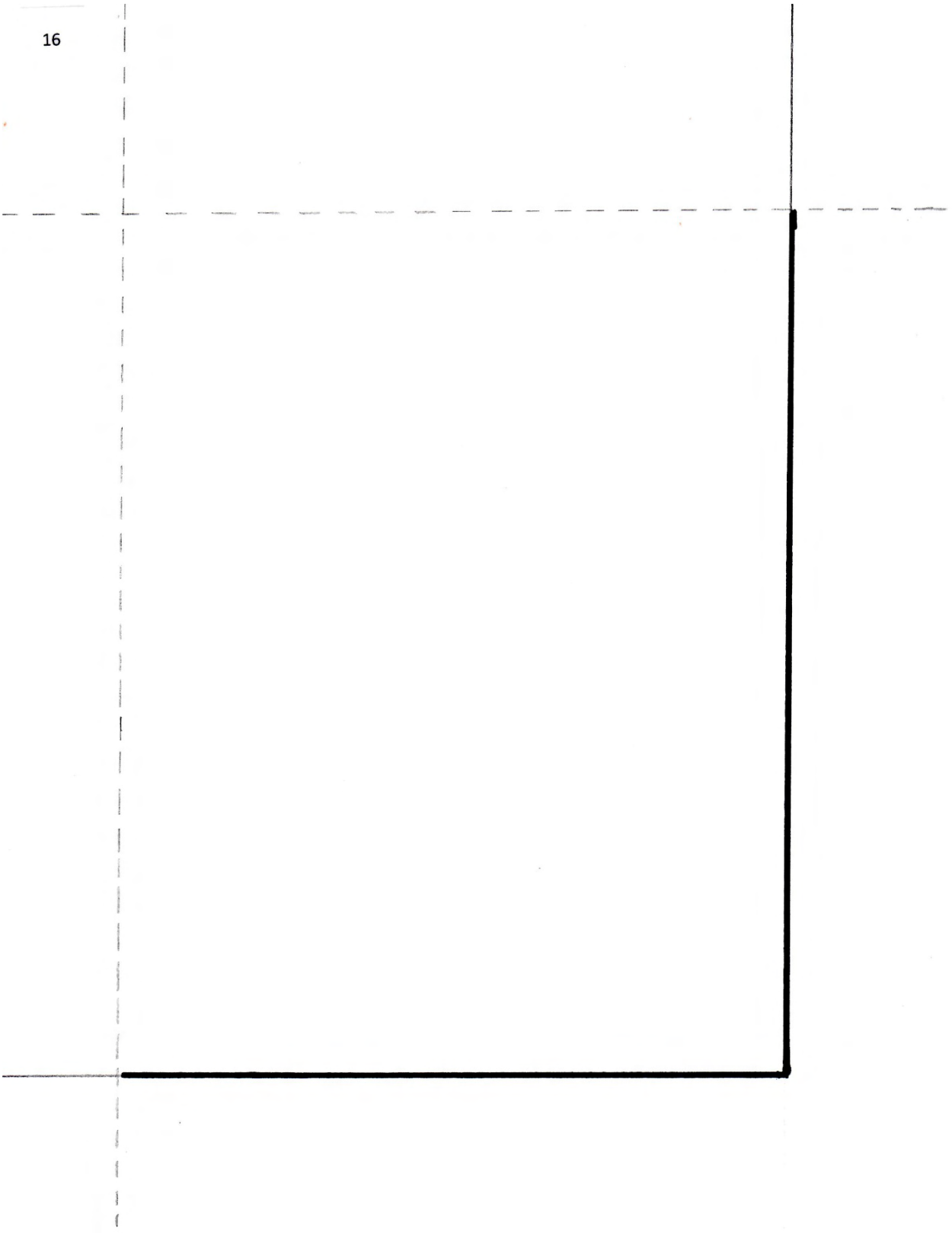
Map Pieces for Assembly



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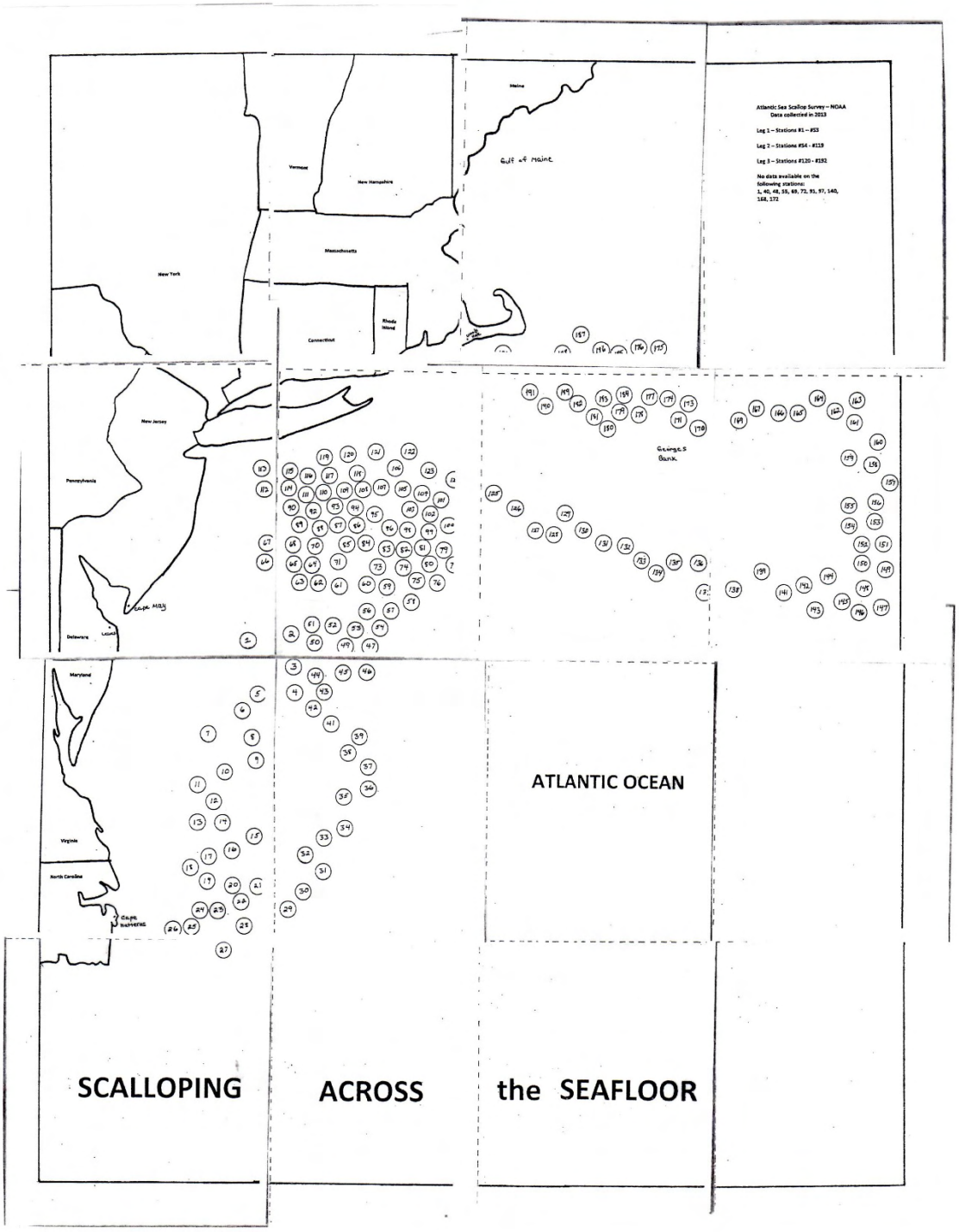

Station #2 **CATCHWT – 0.57 kg** **CATCH # - 3** Low phytoplankton concentrations	**Station #3** **CATCHWT – 15.960 kg** **CATCH # - 395**	**Station #4** **CATCHWT – 33.860 kg** **CATCH # - 522**
Station #5 **CATCHWT – 16.040 kg** **CATCH # - 459**	**Station #6** **CATCHWT – 9.403 kg** **CATCH # - 79**	**Station #7** **CATCHWT – 22.425 kg** **CATCH # - 293**
Station #8 **CATCHWT – 49.060 kg** **CATCH # - 320**	**Station #9** **CATCHWT – 384.480 kg** **CATCH # - 5,984** Optimal temperature and salinity	**Station #10** **CATCHWT – 3.840 kg** **CATCH # - 23** Commercial harvesting of scallops
Station #11 **CATCHWT – 37.160 kg** **CATCH # - 330**	**Station #12** **CATCHWT – 19.621 kg** **CATCH # - 209**	**Station #13** **CATCHWT – 41.640 kg** **CATCH # - 515**
Station #14 **CATCHWT – 24.020 kg** **CATCH # - 85**	**Station #15** **CATCHWT – 24.340 kg** **CATCH # - 281**	**Station #16** **CATCHWT – 164.700 kg** **CATCH # - 2,080** Low population of predators

Atlantic Sea Scallop Survey

Real Data Packet (data collected 2013)

Station # 17 **CATCHWT – 125.800 kg** **CATCH # - 1,704** No commercial fishing in the area (closed)	**Station #18** **CATCHWT – 34.160 kg** **CATCH # - 347**	**Station #19** **CATCHWT – 1.940 kg** **CATCH # - 14** High population of sea stars (*Astropectin americanus)*
Station #20 **CATCHWT – 89.768 kg** **CATCH # - 1,559** Successful larval distribution and bottom settlement	**Station #21** **CATCHWT – 26.680 kg** **CATCH # - 195**	**Station #22** **CATCHWT – 21.720 kg** **CATCH # - 150**
Station #23 **CATCHWT – 14.380 kg** **CATCH # - 100**	**Station #24** **CATCHWT – 5.160 kg** **CATCH # - 39** Delicate spat, do not survive on shifting sand botom	**Station #25** **CATCHWT – 18.021 kg** **CATCH # - 157**
Station #26 **CATCHWT – 21.627 kg** **CATCH # - 261**	**Station #27** **CATCHWT – 44.500 kg** **CATCH # - 853**	**Station #28** **CATCHWT – 23.460 kg** **CATCH # - 150**
Station # 29 **CATCHWT – 30.480 kg** **CATCH # - 181**	**Station #30** **CATCHWT – 28.850 kg** **CATCH # - 149**	**Station #31** **CATCHWT – 24.760** **CATCH # - 125**
Station #32	**Station #33**	**Station #34**

CATCHWT – 0.620 kg **CATCH # - 2** Lethal salinity levels: lower than 16.5 ppt	**CATCHWT – 7.219 kg** **CATCH # - 25** Schools of Atlantic cod and wolf fish in the area	**CATCHWT – 29.800 kg** **CATCH # - 139**
Station # 35 **CATCHWT – 25.100 kg** **CATCH # - 120**	**Station #36** **CATCHWT – 28.740 kg** **CATCH # - 143**	**Station #37** **CATCHWT – 21.944 kg** **CATCH # - 150**
Station #38 **CATCHWT – 36.817 kg** **CATCH # - 370**	**Station #39** **CATCHWT – 22.200 kg** **CATCH # - 240**	**Station #41** **CATCHWT – 20.440 kg** **CATCH # - 164**

Station #42 **CATCHWT –8.400kg** **CATCH # - 26** Commercial fishing in the area	**Station #43** **CATCHWT –5.760 kg** **CATCH # -28** Ocean dumping in the area	**Station #44** **CATCHWT –25.340 kg** **CATCH # -106**
Station #45 **CATCHWT –7.680 kg** **CATCH # - 46** Boring polychaetes in the area (*Polydora websteri)*	**Station #46** **CATCHWT –45.700 kg** **CATCH # -347**	**Station #47** **CATCHWT –47.640 kg** **CATCH # 342**
Station #49 **CATCHWT –5.520 kg** **CATCH # -105**	**Station #50** **CATCHWT –4.440 kg** **CATCH # -30** Elevated concentrations of inorganic suspended material	**Station #51** **CATCHWT - 13.780 kg** **CATCH # -70** Eggs and juveniles fall prey to predators
Station #52	**Station #53**	

CATCHWT –17.780 kg **CATCH # - 101**	**CATCHWT –17.440 kg** **CATCH # - 160**	**Leg 2**
Station #54 **CATCHWT – 8.760 kg** **CATCH # - 35** Many trawlers in the area	**Station #56** **CATCHWT – 13.920 kg** **CATCH # - 88**	**Station #57** **CATCHWT – 43.880 kg** **CATCH # - 282**
Station #58 **CATCHWT – 48.210** **CATCH # - 267**	**Station # 59** **CATCHWT – 1.300 kg** **CATCH # - 17** Winter and yellow tail flounder in abundance	**Station # 60** **CATCHWT – 0.142 kg** **CATCH # - 2** Commercial fishing in the area
Station #61 **CATCHWT – 3.040 kg** **CATCH # - 27** Poor larval distribution	**Station # 62** **CATCHWT – 6.240 kg** **CATCH # - 45** High temperature of 24 degrees Celsius which is lethal	**Station #63** **CATCHWT – 12.060 kg** **CATCH # - 78**
Station #64 **CATCHWT – 11.936 kg** **CATCH # - 73**	**Station #65** **CATCHWT – 0.094 kg** **CATCH # - 3** Overharvesting of adult scallops	**Station #66** **CATCHWT – 8.840 kg** **CATCH # - 43** High population of sea stars (*Astropectin americanus)*

Station #67 **CATCHWT – 73.440 kg** **CATCH # - 466**	**Station #68** **CATCHWT – 0.212 kg** **CATCH # - 1** Oil spill in the area	**Station #70** **CATCHWT – 1.168 kg** **CATCH # - 1,920**
Station #71	**Station #73**	**Station #74**

CATCHWT – 18.079 kg **CATCH # - 35,707** Successful larval distribution and bottom settlement	**CATCHWT – 12.940 kg** **CATCH # - 24** Commercial fishing in the area	**CATCHWT – 1.855 kg** **CATCH # - 6** Nutrient pollutants disrupt the ecosystem balance
Station # 75 **CATCHWT – 2.508 kg** **CATCH # - 3,674** Optimal water parameters and successful spawning	**Station #76** **CATCHWT – 44.880 kg** **CATCH # - 173**	**Station #77** **CATCHWT – 25.513 kg** **CATCH # - 234**
Station #78 **CATCHWT – 100.400 kg** **CATCH # - 508**	**Station #79** **CATCHWT – 0.564 kg** **CATCH # - 4** Predators such as eel pouts and sculpins in the area	**Station #80** **CATCHWT – 1.160 kg** **CATCH # - 9** Lack of success during larval distribution
Station #81 **CATCHWT – 4.700 kg** **CATCH # - 24** Eggs and juveniles eaten by predators	**Station #82** **CATCHWT – 8.580 kg** **CATCH # - 35** No spawning due to water parameters out of range such as salinity and temperature	**Station # 83** **CATCHWT – 26.060 kg** **CATCH # - 128**
Station # 84 **CATCHWT – 5.820 kg** **CATCH # - 27** Trawlers in the area, overharvesting	**Station # 85** **CATCHWT – 16.700 kg** **CATCH # - 227**	**Station # 86** **CATCHWT – 46.000 kg** **CATCH # - 536**
Station # 87 **CATCHWT – 52.920 kg** **CATCH # - 63,589** Optimal water parameters, successful larval distribution and plenty of food	**Station #88** **CATCHWT – 2.463 kg** **CATCH # - 351**	**Station #89** **CATCHWT – 0.038 kg** **CATCH # - 8** High population of Atlantic cod and yellow tail flounder (predators)

Station # - 90 **CATCHWT – 0.319 kg** **CATCH # - 29** Evidence of pesticide runoff in the area	**Station # 92** **CATCHWT – 1.300 kg** **CATCH # - 3** Algal blooms that emit lethal toxins	**Station #93** **CATCHWT – 13.500 kg** **CATCH # - 54** Commercial fishing in the area

Station # 94 **CATCHWT – 12.300 kg** **CATCH # - 61** Habitat degradation due to excessive dredging	**Station # 95** **CATCHWT – 32.980 kg** **CATCH # - 620**	**Station #96** **CATCHWT – 9.073 kg** **CATCH # - 439**
Station #98 **CATCHWT – 16.060 kg** **CATCH # - 80**	**Station #99** **CATCHWT – 6.700 kg** **CATCH # - 44** Commercial fishing	**Station #100** **CATCHWT – 8.395 kg** **CATCH # - 30** Ocean pollution
Station # 101 **CATCHWT – 12.100 kg** **CATCH # - 102**	**Station #102** **CATCHWT – 12.454 kg** **CATCH # - 145**	**Station #103** **CATCHWT – 40.400 kg** **CATCH # - 537**
Station #104 **CATCHWT – 44.094 kg** **CATCH # - 1,730** Few predators in the area, high populations of phytoplankton and detritus to eat	**Station # 105** **CATCHWT – 9.920 kg** **CATCH # - 288**	**Station #106** **CATCHWT – 1.260 kg** **CATCH # - 85**
Station # 107 **CATCHWT – 33.680 kg** **CATCH # - 607**	**Station # 108** **CATCHWT – 96.265 kg** **CATCH # - 2,040** Full strength seawater for spawning	**Station #109** **CATCHWT – 139.185 kg** **CATCH # - 14,446** High populations of phytoplankton and microzooplankton

Station # - 110 **CATCHWT – 3.230 kg** **CATCH # - 495**	**Station # 111** **CATCHWT – 25.680 kg** **CATCH # - 181**	**Station # 112** **CATCHWT – 80.456 kg** **CATCH # - 552**
Station # 113 **CATCHWT – 34.920 kg** **CATCH # - 915** Optimal water parameters and plenty of food	**Station # 114** **CATCHWT –28.660 kg** **CATCH # - 135**	**Station 115** **CATCHWT – 12.196 kg** **CATCH # - 45** Unsuitable surfaces for delicate spat to settle on
Station #116 **CATCHWT – 12.740 kg** **CATCH # - 54** Ocean dumping in the area	**Station #117** **CATCHWT – 20.464 kg** **CATCH # - 181**	**Station # 118** **CATCHWT – 14.920 kg** **CATCH # - 67**

Station # 119 **CATCHWT – 12.720 kg** **CATCH # - 37** Ocean drilling for oil and gas in the area	**3rd Leg**	**Station # 120** **CATCHWT – 106.540 kg** **CATCH # - 234**
Station # 121 **CATCHWT – 20.700 kg** **CATCH # - 176**	**Station # 122** **CATCHWT – 5.529 kg** **CATCH # - 26** Low populations of phytoplankton and microzooplankton in the area (food source)	**Station # 123** **CATCHWT – 2.280 kg** **CATCH # - 7** Commercial fishing in the area
Station # 124 **CATCHWT – 22.572 kg**	**Station # 125** **CATCHWT – 8.040 kg**	**Station # 126** **CATCHWT – 3.480 kg**

CATCH # - 162	**CATCH # - 32** Natural mortality of adult scallops	**CATCH # - 19** School of Atlantic cod in the area
Station #127 **CATCHWT – 17.300 kg** **CATCH # - 99**	**Station #128** **CATCHWT – 0.780 kg** **CATCH # - 2** Commercial fishing in the area	**Station #129** **CATCHWT – 8.220 kg** **CATCH # - 42** High population of lobsters (*Homarus americanus)* in the area
Station #130 **CATCHWT – 4.280 kg** **CATCH # - 27** Unsuccessful larval distribution in the area	**Station #131** **CATCHWT – 21.120 kg** **CATCH # - 85**	**Station #132** **27.640 kg** **CATCH # - 121**
Station # 133 **CATCHWT – 0.808 kg** **CATCH # - 4** Elevated concentrations of inorganic suspended material which interfere with feeding	**Station #134** **CATCHWT – 35.120 kg** **CATCH # - 212**	**Station #135** **CATCHWT – 27.840 kg** **CATCH # - 189**
Station #136 **CATCHWT – 22.560 kg** **CATCH # - 76** Predators present during spawning of the scallops	**Station #137** **CATCHWT – 5.160 kg** **CATCH # - 12** High population of groundfish such as winter flounder and sculpins	**Station #138** **CATCHWT – 0.810 kg** **CATCH # - 4** Trawling and dredging in the area
Station #139 **CATCHWT – 4.960 kg** **CATCH # - 14** Commercial fishing in the area	**Station #141** **CATCHWT – 32.717 kg** **CATCH # - 190**	**Station #142** **CATCHWT – 18.619 kg** **CATCH # - 137**

Station #143 **CATCHWT – 12.120 kg** **CATCH # - 84**	**Station #144** **CATCHWT – 14.660 kg** **CATCH # - 93**	**Station #145** **CATCHWT – 5.480 kg** **CATCH # - 28** Low salinity in the area – 14.0 ppt (lethal)
Station #146 **CATCHWT – 6.480 kg** **CATCH # - 35** Mortality during natural settlement of larvae	**Station #147** **CATCHWT – 0.573 kg** **CATCH # - 1** Population explosion of toxic phytoplankton	**Station #148** **CATCHWT – 21.020 kg** **CATCH # - 207**
Station #149 **CATCHWT – 6.340 kg** **CATCH # - 25** Ocean pollution from shipping spills	**Station #150** **CATCHWT – 51.300 kg** **CATCH # - 147**	**Station #151** **CATCHWT – 5.540 kg** **CATCH # - 40** Commercial fishing/dredging
Station #152 **CATCHWT – 15.380 kg** **CATCH # - 106**	**Station #153** **CATCHWT – 2.080 kg** **CATCH # - 10** High population of sea stars in the area – *Crossater papposos and Astropectin americanus*	**Station #154** **CATCHWT – 6.960 kg** **CATCH # - 37** Low survival rate of spat due to shifting sand bottom
Station #155 **CATCHWT – 1.499 kg** **CATCH # - 25** Eel pouts, wolf fish and lobsters (predators) in the area	**Station #156** **CATCHWT – 4.180 kg** **CATCH # - 31** Low phytoplankton and microzooplankton (food source)	**Station #157** **CATCHWT – 116.440 kg** **CATCH # - 724** Closed area to commercial fishing and harvesting

Station #158 **CATCHWT – 488.553 kg** **CATCH # - 3,188** No commercial harvesting in the area	**Station #159** **CATCHWT – 28.809 kg** **CATCH # - 119**	**Station #160** **CATCHWT – 0.172 kg** **CATCH # - 1** Commercial fishing
Station # 161 **CATCHWT – 41.480 kg** **CATCH # - 280**	**Station #162** **CATCHWT – 18.660 kg** **CATCH # - 78**	**Station #163** **CATCHWT – 136.560 kg** **CATCH # - 1,060** Low populations of predators in the area
Station #164 **CATCHWT – 75.320 kg** **CATCH # - 460**	**Station #165** **CATCHWT – 35.740 kg** **CATCH # - 361**	**Station #166** **CATCHWT – 90.568 kg** **CATCH # - 337**

Station # 167 **CATCHWT – 15.920 kg** **CATCH # - 80**	**Station #169** **CATCHWT – 89.001 kg** **CATCH # - 376**	**Station #170** **CATCHWT – 150.060 kg** **CATCH # - 426**
Station #171 **CATCHWT – 35.644 kg** **CATCH # - 135**	**Station # 173** **CATCHWT – 63.664 kg** **CATCH # - 325**	**Station #174** **CATCHWT – 664.599 kg** **CATCH # - 5,062** Optimal water parameters and food
Station # 175 **CATCHWT – 120.585 kg** **CATCH # - 764**	**Station #176** **CATCHWT – 63.495 kg** **CATCH # - 212**	**Station # 177** **CATCHWT – 5.262 kg** **CATCH # - 26** Harmful algal bloom release toxins
Station # 178 **CATCHWT- 40.109 kg**	**Station #179** **CATCHWT – 23.940 kg**	**Station #180** **CATCHWT – 271.680 kg**

CATCH # - 197	**CATCH # - 202**	**CATCH# - 672**
Station # 181 **CATCHWT – 2.840 kg** **CATCH # - 12** Boring polychaetes present *(Polidora websteri)*	**Station # 182** **CATCHWT – 7.740 kg** **CATCH # - 20** High populations of sea stars (*Astropectin americanus)*	**Station #183** **CATCHWT – 93.800 kg** **CATCH # - 814** Few predators in the area
Station # 184 **CATCHWT – 101.065 kg** **CATCH # - 370**	**Station # 185** **CATCHWT – 49.360 kg** **CATCH # - 455**	**Station # 186** **CATCHWT – 44.020 kg** **CATCH # - 397**
Station # 187 **CATCHWT – 29.160 kg** **CATCH # - 414**	**Station # 188** **CATCHWT – 17.240 kg** **CATCH # - 87**	**Station # 189** **CATCHWT – 14.408 kg** **CATCH # - 52**
Station # 190 **CATCHWT – 18.998 kg** **CATCH # - 82**	**Station # 191** **CATCHWT – 12.524 kg** **CATCH # - 64**	**Station #192** **CATCHWT – 1.755 kg** **CATCH # - 7** Larvae preyed on by filter feeders and planktonic carnivores

Student Data Sheet

Station #	Catch wt	Catch #	Environmental Scenario	Natural or Human Impact

Total catch wt: _____ Total catch #: _____

Discussion Questions:

1. Based on catch weight and catch numbers, does this surveyed area appear sustainable? Explain your answer.
2. Discuss five anthropogenic activities that have a negative impact on the Atlantic Sea Scallop population.
3. List five predators of the Atlantic Sea Scallop.
4. Discuss three natural causes of sea scallop mortality.
5. Discuss how the closure of an area to commercial fishing for a given period of time would affect a sea scallop population.
6. Discuss the following legislation:
   a) Sustainable Fisheries Act
   b) Magnuson-Stevens Fishery Conservation and Management Act
7. Discuss Tragedy of the Commons and free-access resources and how it relates to this lesson.
8. Research and explain how each of the following is used in population counts:
   a) Woods Hole Habitat Camera (HabCam)
   b) FSCS System – Fisheries Scientific Computer System